# CDF/DØ/CMS Jets and Missing $E_T$ Workshop

# Welcome

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# Why am I here?

- For the past year, Fermilab has been pursuing a Long Range Planning exercise
- LHC subcommittee (Butler, Carena, Strait, Womersley) presented a strong vision for Fermilab's involvement in the LHC
- This vision is now endorsed and supported by the full committee
  - and I believe by the Directorate
- We are taking the first steps towards its implementation



# The next decade

- **We are on the brink of a Revolution in Particle Physics**
  - **the Standard Model is being overthrown**

- **Physics program of the next decade is Beyond the Standard Model (no longer "search for…")**
  - **Detailed exploration of new worlds**
    - **A new world of phenomena at the EWSB/TeV scale**
    - **The new world of neutrino masses and mixings**
      - matter-antimatter asymmetry?
    - **The new world of Dark Matter, Dark Energy**



# New questions

- The revolution brings totally new physics questions which require
  - New ways of working
    - Collaboratory approach, Grid…
  - New connections
    - Astroparticle ↔ accelerator e.g. JDEM
  - New facilities
    - First, fully exploit the LHC
    - Linear Collider
    - neutrino upgrades

- We do not know the answers to the physics questions, but we do know the facilities that we will need …



# Physics questions for the LHC

- Of course you are supposed to know this, but the LHC will determine
  - What is responsible for EW symmetry breaking?
    - SM Higgs or…
  - Is there other new physics at the TeV scale that resolves the hierarchies and infinities of the Standard Model?
    - Supersymmetry or…

- Central challenge for HEP. For example, at Lepton-Photon 2003
  - Ed Witten:
    - importance of experiment leading theory again, "as is natural"
  - Hitoshi Murayama:
    - Our uncertainty of the physics at the TeV scale is like a cloud, blocking our view to what lies beyond

- It is critical for the US HEP community to play a central role in unlocking this physics.



# A vision for the LHC at Fermilab

- A role in LHC that is commensurate with the scale of Fermilab now and our future, hoped-for role in world HEP
- CMS Physics Analysis Center
  - Not just
    - Allow Fermilab to be a very competent collaborating institution
    - "the best place to get your data from"
    - "the best place to be if you can't be at CERN"
  - But "the best place to be if you want to do physics"
    - Why not?
  - Aim to enhance US physics potential overall, and improve the return on US investment in CMS and LHC
- A leading center (the leading center?) for LHC theory/phenomenology
- A leading center (the leading center?) for detector development and accelerator development for the LHC luminosity upgrades



# What would this need?

- Physicists
  - How many?
  - How to get the best?
- Computer infrastructure (Tier I regional center)
- The best buildings/facilities/working environment/videoconferencing
  - Better than at universities
  - Better than at CERN(!)
  - Includes social aspects/quality of life
- Synergies
  - Theorists
  - Other experiments
  - Nearby universities
  - Detector and accelerator work
- Core of Fermilab people resident at CERN(?)
- CMS visitors coming here
- Host one (or more) of the physics analysis groups here
  - Meetings to present/approve results here
  - People from CERN come here, not always vice versa

**More in next talk (Dan Green)**



# We need your input

- **This meeting is not a planning meeting for a Physics Analysis Center**
- **But we do want to take every opportunity to solicit input from the potential user community**
  - **especially US-CMS collaborators and CDF/DØ members**
    - **What do you want from Fermilab in the operations phase?**
    - **What would make Fermilab an attractive place to work?**
    - **Does the vision outlined here resonate with you?**
    - **How do we get there?**
      - We need a clear view of what we should we be doing this year, next year to make it a reality

- **Any help and advice is welcome**
  - **Sarah Eno eno@physics.umd.edu**
  - **Avi Yagil yagil@fnal.gov**



# This meeting

- This meeting is is an attempt to bring together a community around
  - Common physics interests
  - Unmatched (anywhere in the world) expertise in the physics and detector challenges that face us at hadron colliders
    - Start with jets and missing $E_T$
    - Other topics will follow

- In the next decade, High Energy Physics is going to get very exciting.
- I hope the US and Fermilab can be full participants in that excitement without all of us needing to travel 5000 miles to do so.
- The time is right to start something significant here.

**Welcome – and let's get to work!**